

Development of Intelligent Monitoring System (IMS) Modules for the Aquistore CO₂ Storage Project

Award Number: DE-FE0026516

Project Summary:

This project focused on developing an intelligent monitoring system (IMS) comprising new workflows, algorithms, and a user interface for the automation and integration of geologic carbon dioxide (CO₂) storage site monitoring and simulation data. Injection and monitoring data acquired from the SaksPower Aquistore site in Canada were used to build the IMS.

Prime Performer:
University of North Dakota Energy and Environmental Research Center

Principal Investigator:
Nicholas Azzolina

Project Duration:
10/1/2015 – 9/30/2018

Performer Location:
Grand Forks, North Dakota

Program:
Carbon Storage



Figure 1: Location of the Aquistore CO₂ storage pilot project and Boundary Dam Station, the source of the CO₂, in southeastern Saskatchewan.

Project Outcomes:

Researchers developed new workflows, algorithms, and a graphical user interface (GUI) that will allow a carbon capture and storage site operator to more efficiently monitor and manage CO₂ injection and subsurface conditions. The system automates the integration of continuous and periodic monitoring measurements and reservoir simulations with algorithms for visualization and real-time decision-making support. The system consists of a database that stores the monitoring measurements (IMS Database) and a graphical user interface (IMS GUI) used to retrieve data from that database. The IMS Workflow defines the linkage between the IMS GUI and the IMS Database. The IMS GUI is divided into seven modules that address specific aspects of the monitoring system:

Module 1: Well monitoring measurements

Module 2: Distributed temperature system (DTS) measurements

Module 3: Bottom hole temperature and bottom hole pressure analysis

Module 4: DTS analysis

Module 5: Continuous modeling refinement analysis

Module 6: CO₂ plume boundary

Module 7: System evaluation

Presentations, Papers, and Publications

Final Report: [Development of Intelligent Monitoring System \(IMS\) Modules for the Aquistore CO₂ Storage Project](#) (Nov 2014) Nicholas A. Azzolina, José A. Torres, Saurabh Chimote, Lawrence J. Pekot, Matthew E. Burton-Kelly, Neil W. Dotzenrod, Nicholas W. Bosshart, Chantsalmaa Dalkhaa, Scott C. Ayash, Chunxiao Li, David V. Nakles, Charles D. Gorecki, and Heidi M. Vettleson